Development and Validation of an Emotional Intelligence Scale for Puerto Rican Students

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Abstract

This article describes the process of development and validity of an emotional intelligence scale for Puerto Rican students based on Goleman's proposed five dimension model for Emotional Intelligence (EI) (Goleman, 1995). For the proposed five dimensions 105 items were developed. The scale was completed by 191 students from different academic institutions. Item, factor, and correlation analysis were performed to evaluate the psychological properties. The reliability coefficients for dimensions ranged from .48 to .86, and for the total scale was .84. When the general scale was compared with each dimension, correlations ranged from .16 to .76. Preliminary results suggest that the developed scale is partially adjusted to Goleman's five dimension theory. Recommendations are made for strengthening the scale through development and refining of items.

Keywords: Scale development, Emotional Intelligence, Puerto Rican Students

Resumen

El artículo describe el proceso de desarrollo y validación de una escala de inteligencia emocional para estudiantes puertorriqueños/as según el modelo de inteligencia emocional propuesto por Goleman (Goleman, 1995). Se crearon 105 reactivos para las cinco dimensiones. La escala fue completada por 191 estudiantes pertenecientes a diferentes instituciones académicas. Se realizaron análisis de reactivo, factor y correlación para evaluar las propiedades psicométricas. Los coeficientes de confiabilidad para las dimensiones fueron entre .48 a .86, y escala total fue .84. Al comparar la escala general con cada dimensión las correlaciones fueron entre .60 a .76. Resultados preliminares sugieren que la escala está parcialmente ajustada a la teoría propuesta por Goleman. Las recomendaciones sugieren fortalecer la escala mediante el desarrollo y refinamiento de reactivos.

Palabras clave: desarrollo de escala, inteligencia emocional, estudiantes puertorriqueños

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In the past decades different theories have emerged to refine how intelligence is conceptualized, pointing out that intelligence should not be considered as a general concept, but rather as a wealth of developed abilities (Gardner, 1983; Mayer & Salovey, 1993; Sternberg, 1985; Thorndike, 1920). The Intelligence Quotient (IQ) is described as a determinant for human, educational, and occupational development (Deary, Strand, Smith, & Fernandes, 2006). Since its origins, the construct of IQ has been considered by many a strong predictor of educational success and therefore of subsequent professional performance (Jencks, 1979).

Recently another theoretical framework of intelligence has gained attention, redefining the way intellectual abilities are conceptualized. This is the construct of emotional intelligence (EI). This type of intelligence has been defined as a set of cognitive emotional processes that involve perception, comprehension, and emotional regulation which are considered important for adapting to our environment and contribute to the psychological wellbeing (Hoerger, Chapman, Epstein, & Duberstein, 2012). It has also been associated with facilitating academic achievement, job performance, social adjustment, and more recently, mental health (Brackett, Rivers, Shiffman, Lerner, & Salovey, 2006; Fernández-Abascal & Martín-Díaz, 2015; Mayer, Salovey, & Caruso, 2008). Both types of intelligence, cognitive and emotional, can be combined in an enriching way and therefore contribute to the quality of life of the individual, the quality of their decisions, group interactions, and professional success (Damasio 2005; Goleman 2006). The assessment of emotional intelligence in students provides important information about their affective development, as well as an overview of their learning process and how they respond to different situations (Extremera & Fernándes, 2003; Fernández, Salamonson, & Griffiths, 2012).

The concept of emotional intelligence became popularized by Daniel Goleman (Goleman, 1995). His work compiles the most important theories and studies about emotion and EI (Rivera, Pons, Rosario & Ortiz, 2008) integrating concepts from theories such as the multiple intelligence concept proposed by Gardner, along with theories previously developed by Sternberg and Thorndike. The theory also emphasizes the work of Mayer, Salovey and Caruso (1997) who were the first ones to describe the construct of emotional intelligence and have empirically developed the concept. Goleman integrates in his work the important contributions of neuroscientific studies about the emotional system proposed by Joseph LeDoux (2000). Many neurological and psychophysiological studies have aid in the comprehension of the human brain, the interpretation of its relation with the rest of the body, and the comprehension of the interaction established between emotion and the processing of information (Bechara, Tranel, & Damasio, 2000; Damasio, 2005; LeDoux & Phelps, 2000). Such studies offer support for the development and validation of the EI construct providing empirical evidence for its relevance and practical application (Rego & Fernándes, 2005).

There are currently some scales available to measure EI. Among the most commonly used are the Multifactor Emotional Intelligence *S*cale –MEIS (Mayer et al., 1997), Bar-On EQ-I (Bar-On, 1996), EQ-Map (Cooper, 1996/1997), and Emotional Competence Inventory – ECI (Boyatzis, Goleman, & Hay/McBer, 1999). Rego & Fernándes (2005) categorized these scales in competence tests (MEIS), self-

description questionnaires (Bar-On EQ- I y EQ- Map) and self-inform methods (ECI). The difference between these scales lies in the different existing theories about the dimensions that comprehend EI. For example, the MEIS explores emotional perception, comprehension, and emotional management (Mayer et al., 1997) while the Bar-On scale focuses on intra and inter-personal dimensions, adaptability, stress management, and general spiritual state.

Some Emotional Intelligence scales have also been developed or adapted for the Puerto Rican population. Rivera and colleagues (2008) translated and adapted the Bar-On EQ-I test for
the Puerto Rican population, while Valle (2000) worked on the development of a scale to measure EI in the working population. A questionnaire based on Goleman's five dimension model for EI was also developed in the Clinical Psychology doctoral program at the Ponce School of Medicine for the general population (Pons, Rosario-Hernández, & Mañón, 2009). This questionnaire initially consisted of 212 items and after factor analysis only 50 items remained. However, none of these scales aim at measuring EI on Puerto Rican students at the college and graduate level.

For the purposes of this study we worked with Daniel Goleman's proposed dimensions of EI which comprehend, in a general way, the previously proposed theories to explain EI. These are Self-Awareness, Self-Regulation, Motivation, Empathy, and Social Skills. Emotional intelligence has been defined by Goleman as the ability to recognize our own feelings, the feelings of others, motivate us and adequately manage the interactions we have with others and with ourselves (Goleman, 1998). Table 1 presents Goleman's definition of EI through the proposed five domains. These are characteristics or abilities that are not considered in the traditionally proposed construct of cognitive intelligence.

Table 1: *The Five Components of Emotional Intelligence According to Goleman*

Components of EI	Definition
Self-Awareness	Represents the ability to identify our own internal states, preferences, resources and intuitions.
Self-Regulation	It is the control of our internal states, impulses, and resources.
Motivation	The ability to find sources and emotional tendencies that can guide us or facilitate the achievement of our own goals.
Empathy	Represents the ability to understand emotional cues, needs, and worries of others.
Social Skills	The ability to induce in others desirable outcomes.

While the concept of EI is still in an early stage of development, Goleman attempts to provide a clearer definition of the theory through empirical data. However, some may argue that Goleman has failed to achieve this (Mayer, Caruso & Salovey, 2008). Some of the most renowned theories of EI are the ones proposed by Bar-On and Mayer and Salovey. Bar-On (1996) defines EI as a social intelligence that allows us to recognize our own, recognize them in
others, and use this information to guide our thoughts and actions. Also, Mayer and Salovey (1993) defined EI as a type of social intelligence that includes the ability to supervise and understand our own emotions and other people's emotions, discriminate between them and use this information to aid our thoughts and behavior.

With the knowledge that intelligence is not solely defined by cognition we have learned that social adaptation and success do not depend exclusively on the cognitive

intellectual development of a person obtained through IQ-related measures. It has been proposed that emotional intelligence can be correlated with academic achievement in students. Lam and Kirby (2002) found a positive correlation between MEIS scores and general cognitive intelligence in college students. Mavroveli and Sánchez (2011) showed a modest association between individuals emotion-related self-perceptions, which are describe by the authors as EI traits, and academic achievement. They found that higher EI trait scores were related to more nominations from peers for prosocial behaviors and fewer nominations for antisocial behavior, as well as lower scores on self-reported bullying behaviors. Contrary to these findings, Parker, Summerfedlt, Hogan and Majestic (2004) found that EI is not a solid predictor for determining academic achievement. Van Der Zee, Thijs, and Schakel (2002) examined the relationship between self- and others ratings of emotional intelligence with academic intelligence and personality. They also found little evidence that described a relationship between emotional and academic intelligence. Academic intelligence was low and inconsistently related to emotional intelligence, revealing both negative and positive interrelations.

The present study describes the process of development and validation of an emotional intelligence scale for Puerto Rican college and graduate students from different educational institutions across the island. We test the construct validity and reliability of the EI scale for students. Item, factor, and correlation analysis were performed to evaluate the psychometrical properties of the developed scale.

Method

Participants:

A total of 191 Puerto Rican students participated in the study which 65.4% (125) were women and 34.6% (66) were men. The average age mean of the sample was 24.70 years of age, and the age range was from 21 to 40 years of age. Graduate students constituted 53% (101) of the sample, while 40% (90) were at the undergraduate level. Participants were recruited through the snowball method and were part of different academic institutions across the Island at the college or graduate level. Each participant notified an available time to complete the scale and then was given an appointment.

Measures:

Emotional Intelligence Scale for Students (EISS). Each participant completed a sequent of documents as part of this study. The scale itself was composed of a total of 105 items: 16 for Self-Awareness, 26 for Self-Regulation, 15 for Motivation, 24 for Empathy, and 24 for Social skills. The self-report measure of emotional intelligence consisted on a four point scale in which 1 mean totally disagree, 2 somewhat disagree, 3 somewhat agree and 4 totally agree.

Social Desirability Scale (SDS). Also, we used the SDS developed by Rosario-Hernández &Rovira Millán (2002). The scale contains 11 items which measures the tendency of respondents to answer questions in a manner that will be viewed favorably by others. This scale is answered in a Likert format in which 1 mean totally disagree and 4, totally agree. Its validity has been established using the factor analysis method. Cronbach's alpha has been estimated in .86. This scale was used to establish the divergent validity of the EISS.

Procedure:

One hundred and twenty items were developed for the initial scale. We performed a literature review to develop items according to each of the five subscales. The scale was then given to three

judges for analysis of content validity. After integrating the feedback given by the judges, the scale was left with a total of 105 items. Participants arrived to their appointments and proceeded to complete a written informed consent and a demographic sheet. Afterward they completed the self-report measure of emotional intelligence and a SDS to assess the divergent validity of the scale. Procedures were approved by the Institutional Review Boards of the Ponce School of Medicine and Health Sciences.

Before completing the scale each participant was given a consent form explaining in detail the procedure and duration of the study, as well as possible risks and benefits. Confidentiality was explained along with the fact that they could refuse to answer or complete the study at any moment without any repercussions. The demographic sheet was composed of items regarding age, gender, hometown, marital status, and academic preparation (program and academic year).

Statistical Analysis:

Statistical analysis was performed using SPSS software version 20. Item analysis was carried out for each of the five dimensions and a discrimination index of .30 was established as a selection criterion (Kline, 2000). Results then underwent a factorial analysis using the maximum likelihood technique with a varimax rotation. A factorial loading equal or higher than .30 was considered for the dimension in which the item belonged to and less than .30 for the other dimensions. Items with a factorial loading of .30 or above in more than one factor were eliminated from the scale. After factorial analysis was carried out, internal consistencies
(Cronbach's Alpha) were calculated on each of the five extracted factors. To measure the convergent and divergent validity of the scale, a correlation analysis was performed where each dimension was correlated with other dimensions as well as with the SDS.

Results

Table 2: *Discrimination Index (DI) of items by dimension*

Self-Awareness		Self-Regulation		Motivation		Empathy		Social Skills	
Item #	DI	Item #	DI	Item #	DI	Item #	DI	Item #	DI
26*	.54	2*	.34	3*	.50	1	.19	14	-.12
45*	.37	4	-.27	5*	.55	8*	.35	19*	.52
54*	.49	7*	.64	6	.19	10*	.64	22*	.75
55*	.67	9*	.44	12.*	.44	11*	.69	25*	.40
61*	.50	13*	.35	18*	.51	15*	.36	32*	.47
64*	.51	16*	.70	21	.04	24*	.44	33*	.55
68*	.56	17*	.39	29*	.41	28*	.42	35*	.36
70*	.46	20*	.30	37*	.58	36*	.69	38*	.47
71*	.48	23*	.37	39*	.47	46*	.51	42*	.51
73*	.45	27*	.56	44	.15	52*	.57	43*	.30
76*	.40	30*	.47	47*	.48	67*	.66	49*	.65
81	.11	31*	.44	53*	.42	75*	.53	50*	.50
82*	.35	34*	.39	83*	.54	72*	.38	58	-.50
88*	.41	40*	.51	86*	.59	77*	.71	59*	.53
91	.18	41	.03	92*	.62	78*	.46	60*	.44
95	.25	48*	.35	101*	.47	79*	.60	62	.07
97*	.38	51*	.49	103*	.39	80*	.66	63*	.35
98*	.62	56*	.57	106*	.37	87*	.41	65*	.75
99*	.58	57*	.39			93*	.33	66*	.51
105	.19	85*	.32			95*	.36	69*	.62
		89*	.56			102*	.47	74*	.36
		90*	.38			108*	.54	84	-.09
		100*	.55			109*	.31	94*	.49
		104*	.39			110*	.30	96*	.36
		111*	.49			118*	.48	107	.14
		112*	.64					113*	.37
		114*	.34					115*	.42
		116	-.05					117*	.40
		118*	.41					119*	.54
								120	.22

Note: *Item selected; DI=Discrimination Index.

An item analysis was performed by dimension and a .30 or more discrimination index was established as selection criteria. According to the item analysis, only 105 items out of the proposed 120 obtained an index discrimination of .30 or more (Table 2). Each dimension of the scale was analyzed using maximum likelihood factor analysis, and factors were rotated using a varimax rotation procedure. The rotated solution, as shown on Table 3, yielded five interpretable factors: Self-Awareness, Self-Regulation, Motivation, Empathy, and Social Skills. Items with a factorial loading of .30 or more were selected for the subscale to which they belonged theoretically. Moreover, items with similar or equal factorial loadings in more than one factor were eliminated. A total of 27 items were left for the total EQ scale. The Kaiser-

Meyer-Olkin test (KMO) supports the adequacy of the sampling data for the analysis, KMO = .634. Barlett's test of sphericity was significant, X^2 (2926) = 10584.023, p = .000, suggesting that item correlation was high enough to perform factor analysis. All five dimensions obtained an Eigen value higher than 1, according to Kaiser, which suggests that the developed scale is partially adjusted to Goleman's five dimension theory.

Table 3: *Factor Analysis of the Final Version of the EISS*

		Factor				
Subscale	Item	1	2	3	4	5
Self-Awareness	30	**.41**				
	40	**.51**	.25	-.26		
	65	**.51**	.23			
	66	**.63**			.20	
	76	**.39**				
	89	**.44**				
	93	**.35**				.20
Self-Regulation	9					**.69**
	20		.25			**.57**
	23					**.38**
	54					**.46**
Motivation	3		**.58**			
	6	.23	**.49**			
	34		**.39**			
Empathy	8			**.52**		
	10			**.64**		
	16	.29		**.32**		
	92			**.62**		.23
	97	.29	.20	**.44**		
	100			**.54**		
	105			**.36**	.29	
Social Abilities	26				**.78**	
	46		.27	.21	**.38**	
	61		.23	.24	**.64**	
	79				**.90**	
	84	.259			**.37**	
	90				**.89**	
Eigen Value		7.14	5.53	5.46	4.45	4.14
% Explained Variance		9.27	7.18	7.10	5.78	5.38
% Cumulative Variance		9.27	16.45	23.55	29.32	34.70

To obtain the construct validity of the scale, correlation coefficients were computed among the five dimensions of the EISS and the total scale. Results from the SDS were also
correlated with the total score obtained from the EQ measure, as well as with each of the five dimensions. The results of the correlation analysis presented in Table 4 show that all correlations were statistically significant and ranged from .16 to .76. The scale correlated negatively with Social Desirability (-.02) supporting the divergent validity of the scale.

Table 4: *Correlation Matrix of the EISS and its Subscales with the SDS*

Scale/Subscale	1	2	3	4	5	6	7
1.Emotional Intelligence	1						
2.Self-knowledge	.60**	1					
3.Self-regulation	.56**	.19**	1				
4. Motivation	.60**	.28**	.16*	1			
5. Empathy	.72**	.22**	.31**	.35**	1		
6.Social Abilities	.76**	.31**	.22**	.47**	.35**	1	
7.Social Desirability	-.02	-.11	.07	-.02	.06	-.06	1

Note: n=190;*p<.05, **p<.01.

In order to obtain an estimate of the emotional quotient scale's internal consistency, reliability analyses were performed using Cronbach's alpha. The reliability coefficients for the five dimensions as showed on Table 5 ranged from .48 to .86. The Social Skills subscale showed the highest reliability coefficient, while the Motivation subscale appeared to be the lowest. The reliability coefficient for the total scale was .84, reflecting appropriate levels of consistency with a standard error measure equal to 3.03. Finally, to facilitate the interpretation of the scale, the mean, standard deviation, standard error measure, confidence interval 95%, minimum and maximum values were determined for the total EISS and each of its dimensions as shown on Table 5.

Table 5

Descriptive Statistics, Reliability, Standard Error of Measure, and Confidence Interval (CI) of 95 % of the Emotional Intelligence Scale for Students (EI) and its Subscales

Scale/Subscale	# Items	Reliability (α)	SEM	CI (95%)	Mean	Standard Deviation	Minimum Value	Maximum Value
EISS	27	.84	3.03	±6	63.82	7.58	1.85	2.91
Self-Awareness	7	.64	1.34	±3	17.92	2.25	2.00	2.90
Self-Regulation	4	.65	1.21	±2	7.84	2.05	1.85	2.21
Motivation	3	.48	.81	±2	7.64	1.12	2.26	2.91
Empathy	7	.74	1.48	±3	16.65	2.89	2.19	2.65
Social Abilities	6	.86	1.14	±2	13.75	3.06	2.03	2.53

Note: n = 191

Discussion

In the present study, two important criteria were established in order to select the appropriate items for the EISS. The first criterion was a discrimination index equal or higher than .30 as evidenced on the item analysis by dimension. A total of 105 items met this criterion. The second selection criterion was a factor loading equal or higher than .30 on the dimension to which they theoretically belonged to and less than .30 in the other dimensions. Twenty-seven items met this criterion. The EISS's internal structure is comprised of five factors or dimensions: the first dimension, Self-Awareness, consists of seven items; the second dimension yielded four items for Self-Regulation; three items comprise the third dimension of Motivation; seven items met the criterion for the fourth dimension of Empathy and six items for the fifth dimension of Social Abilities.

Results from the reliability analysis showed moderate to high positive indexes. These results suggest that the EISS possess homogeneous items with good quality, which shows that the scale is a reliable instrument due to its high internal consistency. Therefore, results obtained from the scale will be highly reliable.

To obtain the construct validity of the scale, correlations were performed between the EISS, its subscales, and the SDS. The results from the analysis showed a moderate to high correlation between the EISS and its subscales, while the scale showed a negative correlation with the SDS. This suggests that the subscales are highly correlated with the EISS. While low to moderate correlations were obtained between subscales, this suggests that they are related to each other, but are measured independently. When the correlation analyses are taken together, they support the convergent validity of the EISS. Moreover, the low to moderate correlations obtained between the EISS and its subscales with the SDS suggest that both scales measure different constructs. This in turn, supports the divergent construct validity of the EISS.

Contemporary theories of EI propose that the construct is highly related to cognitive performance and that it can be a good predictor of scholastic performance (Agnoli et al., 2012; Joseph & Newman, 2010). This provides support for the development of instruments that measure EI, particularly in the student population, based on integrative theories such as Goleman's. As shown in this study, the developed scale was partially adjusted to Goleman's five dimension theory. Lastly one of the final steps in the process of developing and validating any instrument is to check the reliability of the instrument. A reliability coefficient (alpha) of .70 or higher is considered acceptable reliability.

The major limitation of the study was the sample size. In order to generalize the results, a greater sample size should be considered. When increasing the sample,

more items should be added to the scale which will allow the refinement of the instrument. A cross validation of the scale was not performed, which also brings another limitation to the study. All the analyses performed for the scale were carried out with a single sample. Crocker and Algina (1986) suggest that item selection and reliability and validity analyses should not be performed with the same sample to avoid repetition of sampling errors. The EISS's reliability was also not measured through time. The reliability of the scale was measured only through its internal consistency. Temporal consistency should also be established since it provides further support for the scale's use through time.

The reliability of the EISS and its subscales is supported by their internal consistencies. We conclude that a revision of current items in the scale, particularly the motivation subscale, should be performed in order to provide a better reliability for the scale. Future studies should consider expanding the sample in order to obtain a more equitable representation of the Puerto Rican student population. This will allow a more detailed analysis of the scale using structural equation models. More items should be developed for the scale to assure a greater validity. Once the scale has been refined, the process of development of appropriate norms can be carried out. The results create a promising base for the use of the scale to measure emotional intelligence in undergraduate and graduate students in Puerto Rico.

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Appendix A

Código: _____

Ponce School of Medicine and Health Sciences
Clinical Psychology Program

Escala de Inteligencia Emocional para

Estudiantes

Instrucciones:
A continuación se presentan unas aseveraciones, trate de contestarlas todas sin omitir ninguna. Favor de contestar honestamente cada aseveración. Deberá marcar con una X el grado de acuerdo con lo que se expone.

Aseveraciones	Totalmente en Desacuerdo	Algo en Desacuerdo	Algo en Acuerdo	Totalmente de Acuerdo
Soy una persona auto-motivada.				
Tengo un propósito en la vida.				
Casi nunca puedo identificar cuando alguien está molesto conmigo.				
Me altero con facilidad.				
Me resulta difícil entender cómo se sienten las demás personas.				
Es fácil para mí entender los sentimientos de los demás.				
Reacciono con calma ante el enojo de otros.				
Puedo calmarme con facilidad cuando estoy enojado/a.				
Me gusta ser líder.				
Me gusta conocer nuevas personas.				
Cuando algo se me hace difícil, dejo de hacerlo.				
Aseveraciones	**Totalmente en Desacuerdo**	**Algo en Desacuerdo**	**Algo en Acuerdo**	**Totalmente de Acuerdo**
Puedo trabajar bajo presión.				

Me gusta tomar iniciativa.				
Soy impulsivo/a.				
Los demás piensan que soy un buen líder.				
Me motiva saber que tendré éxito si estudio.				
Otros pueden confiar en mí.				
Mis relaciones más cercanas son muy importantes para mí.				
Soy un buen líder.				
Soy una persona sociable.				
Hablo de mis sentimientos con otras personas.				
Respeto la opinión de otra persona aunque esté en desacuerdo.				
Evito pedir ayuda aunque la necesite.				
Me considero un/a líder.				
Cuando veo a alguien en problemas, me ofrezco a ayudarle.				
Soy sensible a los sentimientos de los demás.				
Cuando estoy molesto/a, pierdo el control.				